

ZOH452: TOXICOLOGY AND CANCER BIOLOGY

Teaching hours

10hrs /Unit

COURSE OUTCOME

1. Course focuses on different toxins of animal origin.
2. Understanding the mode of action of chemicals, toxins and fundamentals of toxicological assays.
3. Students are trained in forensic toxicological techniques. They are made aware of drug abuse and its ill effects.
4. Students get basic knowledge on mutations, genotoxicity, carcinogens and carcinogenesis.
5. Advanced cancer treatment modalities are discussed.
6. Course helps students to get into various toxicological labs as drug inspectors, quality controllers and even as oncologists.
7. Apply different toxicological frameworks within the professional disciplines and have awareness about different risk assessment criteria.

UNIT-I

Introduction- Definitions, Major subdivisions of toxicology. Dose-response relationships and their importance. Frequency response and cumulative response. Factors influencing toxicity- Route of administration, host factors-species, strain, age and sex, .Toxic responses to xenobiotics: Molecular, subcellular, cellular, allergic/sensitization reactions and Idiosyncrasy. A brief account of Regulatory Guidelines and Good Laboratory Practices, General rodent and non-rodent species and strains used in toxicological studies,

UNIT-II

Toxicological testing methods- Acute, sub-chronic and chronic toxicity tests, LD₅₀, LC₅₀ and ED₅₀, Teratogenicity testing (abnormal and altered growth in fetus), Reproductive toxicology- Effect of xenobiotics on male and female reproductive organs/cells in mammals. Organ/tissues specific toxicity.. Toxicity of metals (Lead, Mercury, Arsenic, Cadmium). Pesticide toxicity- organophosphate, Organo-chlorine and Carbamate insecticides, Toxicity of pyrethroids. Bio-magnification. Natural toxins- microbial, plant and animal toxins..

UNIT-III

Foundations of forensic toxicology- classification of poisons, sign and symptoms of common poisons. Drugs: Drugs of abuse, classification and identification. Narco analysis and brain mapping. Explosives: Classification, composition and characteristics of explosives, pyrotechniques, IEDs, explosion process and affects. Courtroom testimony, Investigation of toxicity-related death/injury, documentation practices. Considerations for forensic toxicological analysis. A brief account of Ecotoxicology Antidotal therapy,

UNIT –IV

Mutagenesis and genetic toxicology- Bacterial Reverse Mutation Assay, Invitro mammalian cell mutation assay, Invitro mammalian cytogenetic tests, Genotoxicity testing in mammals – Bone marrow chromosomal aberration, micronucleus test, sperm abnormality assay, comet assay. Occupational and environmental exposure -endosulphan tragedy. Classification of human cancers, growth characteristics of cancer cells, tumor angiogenesis, Tumor Metastasis, Tumor staging. Causes of cancers-chemical carcinogenesis; Steps involved in chemical carcinogenesis. Radiation carcinogenesis-ionizing radiation, UV radiation.

UNIT-V

Oncogenes-Functional class of oncogenes (proto-oncogenes), Mechanisms of carcinogenic transformations by oncogenes. Viral oncogenes. Tumor suppressor genes- mechanisms of tumor suppressor in cancer induction (P53). Role of telomere and telomerases in cancer. Tumor immunology-mechanisms of immune response to cancer, natural killer cells, 'Danger theory'. Diagnosis of cancer.

REFERENCES

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11. Max M. Houck, (2018): Forensic Toxicology, 1st Edition, Academic Press, UK, Pp418
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